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Researchers find that fish oil boosts responses to breast cancer drug tamoxifen

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Breast cancer is the second most common cancer among women, with more than 200,000 women diagnosed each year. Being exposed to estrogen over a long period of time is one factor that can increase a woman's risk of developing the disease. One way a woman can combat this risk factor is by taking the breast cancer drug tamoxifen, which interferes with the activity of estrogen. Now, researchers at Fox Chase Cancer Center have found that omega-3 fatty acids—abundant in fish—could be a safe and beneficial booster for tamoxifen therapy.

Jose Russo, MD, director of the Breast Cancer Research Laboratory at Fox Chase, will present the new findings at the AACR 102nd Annual Meeting 2011 on Wednesday, April 6.

To investigate how fish oil intensifies the effects of tamoxifen, Russo, in collaboration with a team led by Andrea Manni, MD, from Pennsylvania State University, induced mammary tumors in rats and then divided the animals into four groups. They fed the groups either a 17 percent fish oil diet, with or without tamoxifen, or a 20 percent corn oil diet, with or without tamoxifen, for eight weeks. They then analyzed gene expression patterns in the tumors. Omega-3 fatty acids produced a greater expression of genes related to cellular specialization, or differentiation—a sign of lower cancer severity—compared to corn oil. The combination of fish oil and tamoxifen reduced the expression of genes linked to tumor growth and spreading.

"If a tumor was being treated with tamoxifen, the addition of an

omega-3 fatty acid diet seemed to make the tumor, at least at the molecular level, more benign and less aggressive and responsive to tamoxifen," says Russo.

The fish oil diet also boosted the expression of genes related to immune defenses against tumors, more so than did the corn oil diet. But omega-3 fatty acids simultaneously increased the expression of genes that trigger counterproductive immune responses, such as inflammation and allergic reactions, which curtail the ability of cells to fight cancer and can even promote the migration of tumor cells.

More studies are needed to fully understand the effects of fish oil on the immune system, Russo says. Meanwhile, his team is examining whether omega-3 fatty acids can prevent breast cancer in animals and testing the influence of diet on breast cancer risk in women.

Provided by Fox Chase Cancer Center